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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	TIMOTHY RAYMOND UBL et al.	**Examiner:**	
Serial No.:	09/500,592	**Group Art Unit:**	
Filed:	February 10, 2000	**Docket No.**	17310-220588
For:	METHOD FOR ADJUSTING A HEAD SUSPENSION PARAMETER		

Commissioner for Patents
Washington, D.C. 20231

I CERTIFY THAT, ON APRIL 23, 2001, THIS PAPER IS BEING DEPOSITED WITH THE U.S. POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO THE COMMISSIONER FOR PATENTS, WASHINGTON, D.C. 20231.

Walter C. Linder

INFORMATION DISCLOSURE STATEMENT

The documents listed on the enclosed Form PTO-1449 are presented pursuant to Applicant's duty of disclosure under 37 C.F.R. § 1.56. A copy of each of these documents is enclosed. Additional information is set forth in the "Background of the Invention" section of the application.

EXPLANATION OF CERTAIN CITED DOCUMENTS NOT IN ENGLISH LANGUAGE

JP 58-88873

Laser trimming of a leaf spring for head suspension of a hard disk drive unit. Control of the laser trimming while measuring load to the head. In Fig. 1, gimbal spring 2 on head arm 1 supports slider 6. The gimbal spring 2 comprises bent portion (shown by hatched area 3) and flap segment 4. In Fig. 2, laser milling unit 9 forms small through-holes in the bent portion of flap segment 4 while measuring a load to the slider by measuring pad 7. The load signal from the pad 7 is compared with a programmed reference in control box 8 to control the laser milling unit 9 until the spring load becomes equal to the programmed reference value. Dug spots or grooves may be formed by laser milling in place of the through-holes.

JP 59-25929

Laser light adjustment of contact pressure of contact spring of a relay. Partial heating or melting of the contact spring by the laser energy makes deviation of the free end of the spring contact to adjust the contact pressure while the free end is subjected with a pressure P by a stopper (i.e. opposing contact of the relay) or a load measurement device. In Fig. 2, contact spring 1 is cantilever-suspended by holder 2. Laser light 3 makes deviation as displacement 5 shown by dotted line 5 from a bent position in the direction of laser irradiation. Pressure P is added in the same direction with the irradiation. Reaction against the pressure P is weakened by the laser irradiation. The additional pressure P is given by stopper 4 (Fig. 3) or an opposing contact of the relay. A pressure imparting means such as a pressure gage or a spring balance may be used to load the pressure P. For automatic adjustment, laser output, laser energy, irradiation position of the laser, strength of the additional pressure P or acting position of the additional pressure may be varied in accordance with pressure or stroke length measurement. The displacement amount of the spring may be varied by geometric sizes of heating area, melting area, or location of these areas across the spring or along the edges of the spring.

JP 53-149107

Control of spring stiffness by laser annealing of a nonferrous contact spring of phosphor bronze connector or beryllium bronze connector. In Fig. 1, laser beam 15 from pulse laser 14 is irradiated to selected portion 13 of spring member 11 made of phosphor bronze via lens 16 to control stiffness of the spring. The portion 13 is used for heat pressure welding on to a circuit portion of a substrate.

JP 60-147982

Use of light source for forming holes in a spring suspension to control a spring load to a magnetic head for adjusting spacing of the floating head against a magnetic disk. Load sensing transducer is used to control the laser milling until a target spring load is obtained. Laser tempering of the spring suspension is used in another embodiment. In Fig. 1, a spring portion of load bar 10 to suspend the magnetic head 1 is irradiated with laser light from YAG laser 50. Load to the head 1 is measured by load transducer 100 via lever 101. Controller 70 compares the measured load value with a present reference to control laser control circuit 70 and pulse motor 130 to shift irradiation position. A hole of 0.1 mm in width and variable length with maximum 0.6 mm long is formed in the spring to have a desired load pressure. In Fig. 2, the spring portion

of load bar 10 to suspend the magnetic head 1 is irradiated with YAG laser 51 via optical fiber 111, lens 120 and quartz glass disk 140. Floating spacing of the head 1 to the surface of glass disk 140 is measured by optical spacing detector 152 using interference between the light from light source 150 and reflection from the head. The floating spacing is adjusted by control circuit 70 which compares measured spacing value with a preset reference value to control laser control circuit 60 and beam shifting device 121. An area of 0.1 mm in width and 2.5 mm in length at the maximum in the spring portion is tempered to obtain a desired load.

JP 61-189463

Laser spot irradiation onto a head spring to adjust floating spacing to a reference disc is controlled via interferometric measurement of head spacing through the transparent disk. In the drawing, laser from irradiation device 8 scans the surface of head spring 5 to relieve strain along dotted melt spots. The laser irradiation and scanning is controlled by measurement of floating height of head core 6 to the surface of transparent disc 3 by interferometric floating height measurement device 7 until a desired spacing is obtained.

JP 5-7572

Laser scan onto spring suspension 1 for a magnetic head deforms the spring by thermal strain. Deformation is controlled with referring to measured value of strain gage 10 so that a desired spring load is obtained. In Fig. 4, laser spots 4 and 4' scan both surfaces of the cantilevered spring suspension 1 controlled by pressure measurement from strain gage 10. Detection/controller 10 connected to the strain gage 10 compares detected pressure with a reference value to energize one of the laser spots 4 and 4' and control scan driver 11. Laser spot 4 is used to decrease the pressure and laser spot 4' is used to increase the pressure.

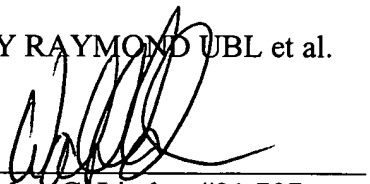
JP 57-167163

A gimbal spring 3 for a hard disk head is formed of a thin film plate 2 of stainless steel deposited on a thermoplastic resin substrate 1 via a process of plating, vacuum evaporation or sputtering. Temper processing is performed to the plate 2 for providing desired spring characteristics.

No fee is believed to be necessary for the entry of this Information Disclosure Statement. Should any fee be required, the Commissioner is authorized to charge our Deposit Account No. 06-0029 and notify us of the same.

Respectfully Submitted,

TIMOTHY RAYMOND UBL et al.

By: 

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